

REMARKS

Claims 1, 4-7, 9-14, 16-18, 20-22 and 24-37 are pending. Of these, claims 1, 18, 22, 31 and 32 are independent.

By this reply, claims 35-37 have been added. Previously, claims 2-3, 8, 15, 19 and 23 were canceled.

CLAIM OBJECTIONS

On page 2 of the Office Action, the Examiner has objected to claims 1 and 14 as each containing a typographical error. Applicants appreciate the Examiner's cooperation in identifying the typographical errors, which have been corrected by this reply. Accordingly, withdrawal of the rejection is requested.

§102 REJECTION

Beginning on page 3 of the Office Action, claims 1, 4-6, 11, 18, 20-22 and 24-34 are rejected under 35 U.S.C. §102(b),¹ as being anticipated by U.S. Pre-Grant Publication (PGPub) 2004/0073831 (the '831 PGPub) to Yanai et al. Applicants traverse.

As noted in Applicants' Background Section (e.g., lines 35 et seq. at page 2),

Traditionally, the administrator monitors the status of the disk pair as reported by the mirroring software; and thus the monitoring of disk pair status, the detection of any interruption in the mirroring process and repair thereof, or predominantly manual processes.

In other words, the administrator manually queries the disk pair for their respective status. Data indicative of that status is provided to the administrator in response to the query. The manner in which such data is presented to the administrator is volatile relative to data in a machine-actionable record of a memory. It exists as an output on a display screen.

The '831 PGPub applied by the Examiner represents nothing more than an example of the sort of art described in Applicants' Background Section. This is explained by the '831 PGPub, e.g., in paragraph [0348],² which is reprinted as follows (underlined emphasis added):

¹ Applicants note that the Examiner has described the rejection as being made under 35 U.S.C. §102(b). Applicants infer that this is a typographical error, and that the Examiner intended to identify §102(e). The publication date of the '831 PGPub is April 15, 2004, whereas Applicants' U.S. filing date is January 11, 2002. As such the '831 PGPub cannot possibly be a reference under §102(b) against the present application.

² See also paragraph [0185].

[0348] The optional host remote mirroring (RM) software (213 FIG. 4) enables an operator to monitor and control remote mirroring and data migration of the data storage system by entering commands at a host system console. In particular, the operator can query the status of the drive and link relationships between remotely mirrored data storage systems, query the synchronization status of each mirrored volume pair, modify the synchronization modes for each mirrored volume pair, and issue commands to suspend or resume the mirroring activity for each mirrored volume pair or an entire data storage system. The host remote mirroring software commands may be integrated into automated operations or host applications, giving the user a robust and elegant implementation of remote mirroring with a great deal of flexibility and control.

In the succeeding paragraphs [0366]-[0566], the '831 PGPub describes various commands that an operator can submit to storage system 214 or 246 (see Fig. 4) by which the operator can obtain data therefrom that is indicative of remote mirroring status. Also, subsequent paragraph [0604] states: "The operator can review the status of the resynchronization process by issuing [the following command]: #SQ VOL,cuu,INV_TRKS". The '831 PGPub is utterly silent regarding what is done with the status information once it is displayed to the operator.

An aspect of claim 1 (taking it as an example) is automatically updating the at least one status field of the machine-actionable memory based upon the requested status information. It is submitted that this aspect of claim 1 represents a distinction over the '831 PGPub. Again, the '831 PGPub is utterly silent as to what is done with the status information provided by storage system 214 or 246 to an operator in response to the operator's submission thereto of a status query.

Applicants note that the '831 PGPub discloses data structures 501-505 within cache 228 of storage system 214 (and a corresponding albeit unnumbered cache in storage system 246); see paragraph [0257]. The discussion in paragraphs [0257]-[0268] make clear, however, that none of the data stored in data structures 501-505 represents status information received from mirroring software relating to at least one storage unit pair. Hence, it would be improper for the Examiner to assert that the status information provided to an operator by either storage system 214 or storage system 246 somehow gets stored in cache 228.

The Examiner has asserted that paragraphs [0287]-[0308] teach "receiving the requested status information," as recited in claim 1. Applicants will assume for the sake of argument that this assertion is reasonable. But this carries the Examiner's position no further

than does the responses to status inquiries disclosed by the '831 PGPub, as discussed above.

Paragraph [0286] of the '831 PGPub states (underlined emphasis added):

In a preferred implementation of the remote mirroring facility, the data storage system reports the following environmental error messages at the service processor user interface, and to the host and the customer service center:

As with the data provided in response to query commands, the '831 PGPub is utterly silent regarding what is done with the error messages once they are displayed to the operator.

The term "status" also arises, among other places, in paragraphs [0268] and [0274], albeit in an irrelevant context. Paragraph [0268] states (underlined emphasis added):

Each link adaptor scans the link queue 504 in an iterative loop, looking for unlocked entries to service, beginning at the head of the queue. The link adaptor locks the next entry to service ... and builds a job to be executed for transferring data from cache across the link [240] in a direct memory access (DMA) operation. In particular, the link adaptor builds a header, and transmits over the link [240] the header, followed by the data, followed by a cyclic redundancy check (CRC). The header, for example, contains a command code such as a code for read or write access link and command status flags, the logical volume number of the secondary (R2) volume to access, and the invalid track count for the secondary (R2) volume.

While the adjective "status" has been used to describe the flags in the header, it is submitted that such flags do not represent status information relating to the storage unit pair, moreover such information represented by the flags in the header is not information of the type that has been requested, e.g., by an operator via a query, in relation to the storage unit pair. Hence, it would be unreasonable for the Examiner to characterize link queue 504 as representing a machine-actionable memory such as is recited in claim 1 taken as a whole.

Paragraph [0274] states (underlined emphasis added):

In Step 544 [of FIG. 21], the link adaptor checks whether the entry it is processing is at the head of the link queue, and if not, the link adaptor waits until the entry reaches the head of the queue. Then in Step 545, the link adaptor removes the entry from the head of the link queue, marks the status information of the header with a timestamp or sequence number, and executes the job to send the command over the link, including the header followed by data read from the cache in a direct memory access (DMA) operation, and a cyclic redundancy check. The timestamp or sequence number can be used by the remote data storage system to detect link transmission problems and to write to its cache in proper sequence

data from commands received from various links and link adaptors despite possible delay of some commands due to link failure. ...

Again, paragraph [0274] coincidentally uses the adjective “status” regarding information in the header. But such information indicates the time at which the entry in the link queue has been removed for servicing, or alternatively the sequence number indicative of the same. Again, it is submitted that such a timestamp or sequence number is not status information relating to the storage unit pair. Moreover, such a timestamp or sequence number is not something requested, e.g., by an operator via a query. As such, it would be unreasonable for the Examiner to interpret the memory (in which the job operated upon according to Step 545 is stored) as corresponding to the machine-actionable memory as recited in claim 1 (taken as a whole).

In view of the foregoing discussion, Applicants reiterate that a distinction of claim 1 over the ‘831 PGPub is automatically updating at least one status field of the machine-actionable memory based upon the requested status information.

Claims 4-7, 9-14 and 16-17 depend at least indirectly from claim 1 and distinguish over the ‘831 PGPub at least for the same reasoning, respectively.

Independent claims 18, 22, 31 and 32 recite a similar feature to that of claim 1 discussed above, and hence each similarly distinguishes over the ‘831 PGPub. Claims 20-21, 24-30 and 33-34 depend at least indirectly from claims 18, 22 and 32, and thus distinguish over the ‘831 PGPub at least for the same reasoning as claims 18, 22 and 32, respectively.

In view of the foregoing discussion, withdrawal of the §102(e) rejection is requested.

NEW CLAIMS 35-37

New claims 35-37 depend from independent claims 1, 22 and 32 at least indirectly and are patentable at least for the same reasons as are claims 1, 22 and 32.

ALLOWABLE SUBJECT MATTER

Applicants acknowledge with appreciation the Examiner’s indication on page 7 of the Office Action that claims 7, 9-10, 12-13 and 16-17 define allowable subject matter but for their dependence upon rejected base claims, respectively.

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CONCLUSION

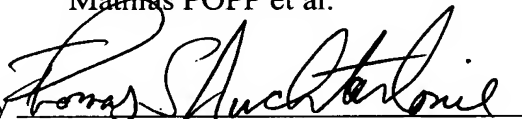
The issues in the case are considered to be resolved. Accordingly, Applicants request a Notice of Allowability.

In the event that there are any outstanding matters remaining in the present application, the Examiner is invited to contact the undersigned to discuss the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-2025 for any additional fees under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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